

AMENDMENT TO THE CLAIMS:

This listing of claims will replace all prior versions of claims in the application:

LISTING OF CLAIMS:

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1. (CURRENTLY AMENDED) A spin valve (SV) sensor comprising:
    - a pinned layer having a pinned layer magnetization;
    - a free layer disposed adjacent towards the pinned layer, the free layer having a free layer magnetization perpendicular to the pinned layer magnetization in the absence of an external field;
    - a spacer layer disposed between the free layer and the pinned layer;
    - a pinning layer disposed adjacent towards the pinned layer for fixing the pinned layer magnetization;
    - an underlayer disposed adjacent towards the pinning layer, the underlayer comprising NiFeX; and
    - an upper layer disposed adjacent the underlayer and the pinning layer, the upper layer comprising a material selected from the group consisting of NiFe and CoFe for increasing a GMR ratio associated with the SV sensor;
    - wherein the upper layer has a thickness less than 20 Å
    - wherein the sensor provides an increase of  $\Delta R/R$  of at least 7% when compared to an otherwise identical sensor not having the upper layer.
  2. (CURRENTLY AMENDED) The spin valve sensor as recited in claim [[2]] 1, wherein the upper layer has a thickness of at least 4 Å.
  3. (CURRENTLY AMENDED) The spin valve sensor as recited in claim [[5]] 1, wherein the upper layer has a thickness of no more than 10 Å less than 5 Å.

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4. (CURRENTLY AMENDED) The spin valve sensor as recited in claim 1, wherein the upper layer is doped with a material other than NiFe or CoFe for decreasing an electrical conductivity of the upper layer. *new matter*
5. (ORIGINAL) The spin valve sensor as recited in claim 1, wherein the underlayer comprises NiFeCr.
6. (ORIGINAL) The spin valve sensor as recited in claim 1, wherein the SV sensor is a component of a disk drive system.
7. (ORIGINAL) The spin valve sensor as recited in claim 1, wherein the underlayer includes 40 +/- 5 Atomic % Cr.
8. (CURRENTLY AMENDED) The spin valve sensor as recited in claim 1, wherein the pinned layer comprises a Ru layer, a first CoFe layer disposed adjacent a first side of the Ru layer and a second CoFe layer disposed adjacent a second side of the Ru layer.
9. (CURRENTLY AMENDED) The spin valve sensor as recited in claim 8, ~~wherein the pinned layer further comprises a first CoFe layer disposed adjacent a first side of the Ru layer and a second CoFe layer disposed adjacent a second side of the Ru layer~~ 1, wherein the upper layer includes both NiFe and CoFe. *112(2)*
10. (CURRENTLY AMENDED) The spin valve sensor as recited in claim 1, ~~wherein the free layer comprises a NiFe layer~~ the underlayer comprises NiFeX where X is not Cr.

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11. (CURRENTLY AMENDED) The spin valve sensor as recited in claim 10, ~~wherein the free layer further comprises a CoFe layer disposed adjacent the NiFe layer 1, wherein the upper layer is non-magnetic.~~ <sup>note</sup>  
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12. (CURRENTLY AMENDED) A method of fabricating a spin valve (SV) sensor comprising:  
depositing an underlayer comprising NiFeX, where X is not Cr;  
depositing an upper layer adjacent the underlayer, the upper layer comprising a material selected from the group consisting of NiFe and CoFe for increasing a GMR ratio associated with the SV sensor;  
depositing a pinning layer adjacent towards the upper layer;  
depositing a pinned layer adjacent towards the pinning layer, the pinned layer having a pinned layer magnetization;  
depositing a spacer layer adjacent towards the pinned layer; and  
depositing a free layer adjacent towards the pinned spacer layer, the free layer having a free layer magnetization perpendicular to the pinned layer magnetization in the absence of an external field[[:]]  
~~wherein the upper layer has a thickness less than 20 Å.~~
13. (ORIGINAL) The method as recited in claim 12, wherein the upper layer has a thickness of at least 4 Å.
14. (CURRENTLY AMENDED) The method as recited in claim 13, wherein the upper layer has a thickness of no more than ~~10 Å~~ 20 Å.
15. (CURRENTLY AMENDED) The method as recited in claim 12, wherein the upper layer is doped with a material other than NiFe or CoFe for at least one of reducing an electrical conductivity of the upper layer and reducing magnetic properties of the upper layer. <sup>have written</sup>

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16. (CURRENTLY AMENDED) The method as recited in claim 12, wherein the ~~underlayer includes NiFeCr~~ upper layer includes both NiFe and CoFe. ) 112(2)
17. (CURRENTLY AMENDED) A spin valve (SV) sensor comprising:  
a pinned layer having a pinned layer magnetization;  
a free layer disposed adjacent towards the pinned layer, the free layer having a free layer magnetization perpendicular to the pinned layer magnetization in the absence of an external field;  
a spacer layer disposed between the free layer and the pinned layer;  
a pinning layer disposed adjacent towards the pinned layer for fixing the pinned layer magnetization, the pinning layer comprising PtMn;  
an underlayer disposed adjacent towards the pinning layer, the underlayer comprising NiFeCr; and  
an upper layer disposed adjacent the underlayer and the pinning layer, the upper layer comprising CoFe for increasing a GMR ratio associated with the SV sensor;  
wherein the upper layer has a thickness less than ~~20 Å~~ 5 Å.
18. (CURRENTLY AMENDED) A spin valve (SV) sensor comprising:  
a pinned layer having a pinned layer magnetization;  
a free layer disposed adjacent towards the pinned layer, the free layer having a free layer magnetization perpendicular to the pinned layer magnetization in the absence of an external field;  
a spacer layer disposed between the free layer and the pinned layer;  
a pinning layer disposed adjacent towards the pinned layer for fixing the pinned layer magnetization, the pinning layer comprising PtMn;  
an underlayer disposed adjacent towards the pinning layer, the underlayer comprising NiFeCr; and

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an upper layer disposed adjacent the underlayer and the pinning layer, the upper layer comprising at least one of NiFe and CoFe for increasing a GMR ratio associated with the SV sensor;

wherein the upper layer has a thickness less than [20 Å] 5 Å.

19. (CURRENTLY AMENDED) A spin valve (SV) sensor comprising:
- a pinned layer having a pinned layer magnetization;
  - a free layer disposed adjacent towards the pinned layer, the free layer having a free layer magnetization perpendicular to the pinned layer magnetization in the absence of an external field;
  - a pinning layer disposed adjacent towards the pinned layer for fixing the pinned layer magnetization;
  - an underlayer disposed adjacent towards the pinning layer, the underlayer comprising NiFeCr; and
  - an upper layer disposed adjacent the underlayer and the pinning layer, the upper layer comprising a material selected from the group consisting of NiFe and CoFe for increasing a GMR ratio associated with the SV sensor;
- ~~wherein the upper layer has a thickness at least 4 Å and less than 20 Å;~~
- wherein the upper layer is doped with a material other than NiFe or CoFe for reducing at least one of an electrical conductivity of the upper layer and magnetic properties of the upper layer.
- new matter*

20. (CURRENTLY AMENDED) A spin valve (SV) sensor comprising:
- a pinned layer having a pinned layer magnetization, the pinned layer comprising a Ru layer with a first CoFe layer disposed adjacent a first side of the Ru layer and a second CoFe layer disposed adjacent a second side of the Ru layer;
  - a free layer disposed adjacent towards the pinned layer, the free layer having a free layer magnetization perpendicular to the pinned layer magnetization in the absence

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of an external field, the free layer comprising a NiFe layer with a third CoFe layer disposed adjacent thereto;

a spacer layer disposed between the free layer and the pinned layer;

a pinning layer disposed adjacent towards the pinned layer for fixing the pinned layer magnetization, the pinning layer comprising PtMn;

an underlayer disposed adjacent towards the pinning layer, the underlayer comprising NiFeCr; and

an upper layer disposed adjacent towards the underlayer and the pinning layer, the upper layer comprising a material selected from the group consisting of NiFe and CoFe for increasing a GMR ratio associated with the SV sensor;

wherein the upper layer has a thickness less than 20 Å;

wherein the upper layer is doped with a material other than NiFe or CoFe for reducing at least one of an electrical conductivity of the upper layer and magnetic properties of the upper layer; 11261

wherein the sensor provides an increase of  $\Delta R/R$  of at least 7% when compared to an otherwise identical sensor not having the upper layer.

21. (CURRENTLY AMENDED) A disk drive system, comprising:

a magnetic recording disk;

a spin valve (SV) sensor including:

a pinned layer having a pinned layer magnetization;

a free layer disposed adjacent towards the pinned layer, the free layer having a free layer magnetization perpendicular to the pinned layer magnetization in the absence of an external field,

a spacer layer disposed between the free layer and the pinned layer,

a pinning layer disposed adjacent towards the pinned layer for fixing the pinned layer magnetization,

an underlayer disposed adjacent towards the pinning layer, the underlayer comprising NiFeX, and

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an upper layer disposed adjacent the underlayer and the pinning layer, the upper layer comprising a material selected from the group consisting of NiFe and CoFe for increasing a GMR ratio associated with the SV sensor;

an actuator for moving the SV sensor across the magnetic recording disk so the SV sensor may access different regions of magnetically recorded data on the magnetic recording disk; and

a controller electrically coupled to the SV sensor for detecting changes in resistance of the SV sensor;

wherein the upper layer has a thickness less than 20 Å;

wherein the sensor provides an increase of  $\Delta R/R$  of at least 7% when compared to an otherwise identical sensor not having the upper layer.

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